AvL TECHNOLOGIES
designs for ultimate performance

13th February 2006

Ms. Marlene H. Dortch, Secretary
Federal Communications Commission
445 12th Street, SW
12 Stree Lobby, TW-A235
Washington, D.C. 20554

Re: **Ex Parte** Submission
IB Docket No. 00-248

Dear Ms. Dortch:

On Friday, February 10, 2006 Jack Gurney, Vice President and myself met with Scott Kotler, Stephen Spaeth and Frank Peace of the International Bureau, Satellite Division to discuss Comments submitted formally by AvL Technologies on September 6, 2006 and October 6, 2006. Attached is a summary of the discussions.

Pursuant to Section 1.1206 of the Commission's Rules, this letter is being filed electronically with your office. If you have any questions, please contact the undersigned.

Yours sincerely

James L. Oliver
President

Cc: Stephen Spaeth, FCC IB
Scott Kotler, FCC IB
Frank Peace FCC IB

Ex Parte Statement No. 1

Date/Time: 2/10/06 9:15AM

Location:
FCC Building
445 12th St., SW
Washington, DC 20024

Present:

FCC	AvL Technologies
Scott Kotler	Jim Oliver
Frank Peace	Jack Gurney

Discussion Topics:

1. Jack Gurney was introduced as the new head of engineering for AvL Technologies.
2. FCC representative discussed upcoming desire to have reference antenna information collected from manufacturers to assist in certifying systems, particularly those requiring short notice.
3. The role of Comsearch, Inc. in coordinating terrestrial microwave sites was described.

Ex Parte Statement No. 2

Date/Time: 2/10/06 9:30AM

Location:
FCC Building
445 12th St., SW
Washington, DC 20024

Present:

FCC	AvL Technologies
Scott Kotler	Jim Oliver
Frank Peace	Jack Gurney
Steve Spaeth	

Discussion Topics:

1. The purpose of this meeting was for AvL Technologies to better explain two documents submitted earlier to the FCC (copies of these documents were distributed at the meeting):
    a. Comments on The Commission's Sixth Report and Order and Third Notice of Proposed Rulemaking Released march 15, 2005 (Att. 1)
    b. AvL Comments on SIA Comments (Att. 2)
2. AvL wanted to make sure the FCC staff has a good understanding of AvL's comments to Docket 00-248. AvL is not proposing additional rules and regulations but alerting the FCC to the actual technical issues concerning motorized small aperture (1.2M and less) antennas used for temporary, fixed applications. Both of these documents discuss technical considerations which should be considered by the FCC in licensing the use of the small aperture satellite antennas that increasingly are being demanded by users including our war fighters, homeland security and first responders. It is felt that applying these technical considerations, smaller antennas could be used, providing lower equipment cost - to these users while at the same time not increasing the possibility of interference with adjacent satellites and most likely decreasing the amount of energy directed to adjacent satellites.The meeting began by Jim Oliver explaining the nature of antenna electrical and control/tracking system performance. During this explanation, the following were discussed:
    a. Antenna main beam characteristics as viewed in both an absolute and a dB scale (Att. 3 and 4).
    b. How antennas are measured on a test range.
    c. Described offset and symmetric antennas and their advantages and disadvantages.
    d. How a control system can be used to acquire a satellite with ease and more accurately than even trained operators and how this technology can greatly increase the use of Geostationary Orbit (GSO) satellite bandwidth.
3. Mr. Oliver then described how there is an increasing desire for satellite communications that is driving a desire for smaller aperture antennas to be used by military and first responders. Consequently, it is in the public's interest to reliably ensure that such antennas, which by virtue of their wider beamwidths, do not interfere with adjacent

satellites. One way of doing this is to take advantage of advances in technology, specifically computer-based control system that can easily and with precision acquire a satellite. Such systems are now available from commercial antenna manufacturers and make it easy for un-trained technicians to acquire the satellite of interest in such a way that there is little possibility that an adjacent satellite will receive interference energy higher than intended by the FCC Rules and Regulations.

4. Discussion concerning disabling an antenna system if it were "kicked" in such a way to move its beam off of the satellite. Mr. Oliver replied that AvL systems currently have some capability to sense this movement and shut of transmit in milliseconds. This capability is important since modern satellite links have so much margin that a considerable antenna movement is required to actually lose lock purely from loss of receive gain..
5. Mr. Oliver then distributed some typical less than 1M and 1.2M Ku band antenna patterns for discussion of other antenna characteristics (Att. 5 and 6). This discussion centered on the fact that for offset antennas, the main beam and sidelobes are largely a function of just the operating frequency and antenna aperture. It was shown how a 1.2M antenna (that is routinely qualified by the FCC) can actually have more potential for adjacent satellite interference through mis-pointing than a 90cm. This has to do with the location of the sidelobe peaks and nulls for the two different apertures and points to the fact that Using only the FCC 25.209 mask to study mis-pointing ramifications can be misleading. In actuality, for antenna apertures smaller than 1.2M, mis-pointing will reduce energy to the adjacent satellite until the edge of the main beam is pointed to an adjacent satellite. This explains AvL's statement in its comments of September 6, 2005 and October 6, 2005 that the real issue is how to control the edge of the main beam from being pointed at the adjacent satellite. It was also noted that routinely licensing 1.2M motorized temporary fixed without questioning amount of backlash or beampointing error is introducing possibility of routine increased energy to the adjacent satellite.
6. It was discussed that Computer controlled antenna pointing is an aid for smaller aperture antennas since it can ensure pointing with $\pm$ 0.1° - 0.2°.
7. Mr. Oliver described how it is essential that elliptical antennas be aligned such that the major axis of the elliptical aperture is tangent to the orbital arc (Att. 7) in order to minimize the possibility of interference by taking advantage of the narrower beamwidth in that direction. This issue was properly addressed in the recent ESV report and order but is incorrectly being addressed in the Sixth order by attempting to reduce elliptical antennas to equivalent diameters for licensing purposes.
8. He also showed how mis-pointing can result in a lesser possibility of interference for some satellite positions due to the orientation of the azimuth and elevation axes relative to the perceived orbital arc.
9. Many of these discussions require a knowledge of some basic antenna characteristics. One document that describes many of these is ANSI/EIA-411-A, "Electrical and Mechanical Characteristics Parameters of Earth Station Antennas for Satellite Communications". AvL recommends that the FCC use this document to understand the industry standards for determining pointing accuracy and other parameters of Earth Station antennas.
10. Mr. Oliver stated he felt that the present FCC pattern mask is probably exceeded at times by up to 3 dB. This amount was in fact proposed to be accepted in the rulemaking in the

mid-1980's but was never adopted. The fact that there is little interference reported to the FCC probably is due to factors like the placement of sidelobe nulls which result in a very low probability that any excursion above the FCC mask actually is ever pointing at an adjacent satellite. AvL feels that the rules should be interpreted to reflect the reality of these conditions as is done is 25.133 where excursions of up to 2 dB have been specifically allowed for years.

11. AvL suggested that the FCC does not have to be experts in antennas or antenna pointing to assure the rules and regulations are being followed. This responsibility can be placed on the applicant by requiring that a Professional Engineer (PE) certify that the system of interest is not expected to interfere with any other satellites or be a safety hazard. It was pointed out that this same method is used today when a PE reviews and "stamps" building and bridge plans prior to submittal to the reviewing Government agency. The PE review ensures the reviewing agency that a qualified professional has carefully examined all aspects of the design and recognizes the fact that the Government agency may not have persons on its staff that can adequately consider all aspects of the design.

In conclusion, AvL endorses formal adopting of the proposed rules and regulations to convert to an energy mask instead of an antenna sidelobe mask and to begin this mask at 1.5°. AvL also suggests that the FCC allow use actual antenna information and pointing capabilities in application of the existing rule of 25.209 (f) that states that antennas will be routinely licensed if "upon a finding by the Commission that unacceptable levels of interference will not be caused under conditions of uniform 2° orbital spacing." In "determining" the FCC would find using Professional Engineering verification provided by the applicant as a simple way to evaluate applications.

Before the
Federal Communications Commission
Washington, D.C. 20554

Attachment 1

In the Matter of	)	
	)	
2000 Biennial Regulatory Review--	)	IB Docket No. 00-248
Streamlining and Other Revisions of	)	
Part 25 of the Commission's Rules	)	
Governing the Licensing of, and	)	
Spectrum Usage by, Satellite Network	)	
Earth Stations and Space Stations	)	
	)	
Amendment of Part 25 of the Commission's	)	IB Docket No. 86-496
Rules and Regulations to Reduce Alien	)	
Carrier Interference Between Fixed-	)	
Satellites at Reduced Orbital Spacings and	)	
to Revise Application Procedures for	)	
Satellite Communication Services	)	

COMMENTS OF AVL TECHNOLOGIES, INC.
ON
THE COMMISSION'S SIXTH REPORT AND ORDER AND THIRD NOTICE OF PROPOSED RULEMAKING RELEASED MARCH 15, 2005

James Oliver, President
AvL Technologies, Inc.
130 Roberts Street
Asheville, NC 28801
Tel: (828) 250-9950

William K. Coulter, Esq.
Coudert Brothers
1627 I Street, N.W.
Suite 1200
Washington, DC 20006
Tel: (202) 775-5100

Its Attorneys

September 6, 2005

Before the
Federal Communications Commission
Washington, D.C. 20554

In the Matter of	)	
	)	
2000 Biennial Regulatory Review--	)	IB Docket No. 00-248
Streamlining and Other Revisions of	)	
Part 25 of the Commission's Rules	)	
Governing the Licensing of, and	)	
Spectrum Usage by, Satellite Network	)	
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Rules and Regulations to Reduce Alien	)	
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Satellites at Reduced Orbital Spacings and	)	
to Revise Application Procedures for	)	
Satellite Communication Services	)	

COMMENTS OF AVL TECHNOLOGIES, INC.
ON
THE COMMISSION'S SIXTH REPORT AND ORDER
AND THIRD NOTICE OF PROPOSED RULEMAKING
RELEASED MARCH 15, 2005

AvL Technologies, Inc. ("AvL") hereby submits its Comments on the Commission's Sixth Report and Order and Third Notice of Proposed Rulemaking [FCC 05-62], Released March 15, 2005.

A. AvL recommends the FCC consider the demonstration of pointing accuracy as a means of granting routine licensing of antennas that do not meet the requirements of the proposed 25.209 (a), (b) and (g) beginning a 1.5° but will meet 25.209 (f).

1. In FCC 05-63, *Fifth Report and Order in IB Docket No. 00-248 and Third Report and Order in CC Docket No. 86-496* the Commission states "Our primary goal in this proceeding is to streamline our review of earth station applications that, while they fail to meet the technical standards for routine processing currently in Part 25, can because of advances in technology, be operated without causing harmful interference to adjacent satellites or terrestrial wireless operations in shared bands." In its research for this Report and Order the Commission has recognized that controlling EIRP density is the correct controlling specification and that advances in technology of modulation techniques, such as spread spectrum and CDMA, can reduce the power density transmitted and

consequently allow transmission from very small aperture (non-compliant) antennas without exceeding the allowable EIRP density. The Commission should also recognize other advances in technology during its consideration such as computer controlled positioning of temporary-fixed antennas. The FCC should embrace this existing technology that was originally developed for large aperture satellite antennas so that the smallest aperture antennas can be used to further increase the use of satellite broadband communications.

2. In the 1970's commercial microprocessors for equipment control were introduced. The first was the Intel 8088 microprocessor. At approximately the same time, optical encoders for regular motors and stepper motors became less costly and readily available. This allowed creating computer controlled equipment capable of performing at very high accuracies (0.001 inches and 0.01 degrees) which could be operated by normal people instead of highly trained and skilled craftsmen. The first major implementation was in CNC metal machining equipment. CNC equipment allowed producing precision components using unskilled machine loaders instead of craftsmen. All they need to know was how to load the raw material and push the start button. This same technology of programming a precise positioning operation was extended into all types of equipment including critical / medical operating equipment for never before attempted eye surgery and in un-critical applications as sewing embroidery company logo's on shirts and hats. The reduction in cost and expansion of capability of this technology can be easily realized with by the $198 printer that can produce photo quality pictures. This technology is being used in almost all equipment from automobiles, airplanes, spacecrafts, copiers, printers, money processing, etc. It is a technology that the FCC should consider in setting regulations for fixed and fixed temporary earth station antennas in addition to ESV satellite antennas.

3. Automatic and accurate positioning of fixed VSAT antennas is also easily doable but for some reason not used at this time. The problems of human error in manually positioning small aperture, wide beam satellite antennas should not drag down and prevent the use of smaller aperture antennas using automatic and accurate computer driven methods. The FCC should separate human pointing of fixed VSAT antennas and computer pointing of temporary-fixed antennas and address them as totally separate categories. This need to separate the two methods has occurred largely because of the reduction in antenna aperture sizes. Large aperture antenna manufacturers quickly embraced automatic positioning because of the narrow beamwidths. While humans could achieve satisfactory results with careful application of their trained skills, satellite movement, wind disturbances and the need for automatic tracking of parabolic antennas caused computer controlled positioning to be quickly embraced by earth station antenna manufacturers and users. The addition of Ku-band satellites during the late 70's forced the use of this technology. Specifications of positioning accuracy within 0.1° were common place. Because the large aperture antenna had such a narrow beam, the FCC did not have to address antenna pointing accuracy in its rules and regulations because failing to correctly point a large aperture antenna resulted in problems only for the user and not for the adjacent satellite operators. This same technology and knowledge can be applied to smaller aperture antennas in order to prevent adjacent satellite interference.

Only when Satellite News Gathering became common place did adjacent satellite interference become an issue. This was due to human error and could have been completely eliminated by the use of computer technology for this application. While manual pointing can be within 0.5° per SIA or 0.4° per Spacenet, computer pointing can easily achieve 0.2° or better.

4. In conclusion, AvL Technologies asks the FCC to embrace using existing automatic and accurate positioning methods used by the larger aperture satellites, ESV satellite antennas and essentially all other commerce to expand the use of satellite communications. Not wishing to address pointing technology and specifications is not in the best interest of expanding the use of satellite communication. AvL Technologies recommends interpreting 25.209 (f) to mean that a demonstration that 25.209 (f) can be achieved with computer pointing of the satellite antenna such that the main beam of the antenna above $29 - 25 \log \Theta$ does not point at the adjacent satellite. This is equivalent to that of the Third Order for ESV's. Also, power reduction or affidavits from adjacent satellites should only be required if 25.209 (f) is not met.

B. AvL offers the following comments concerning the Fifth and Sixth Report and Orders.

1. AvL agrees with the Commission and SIA on allowing routine processing of Ku-band earth stations that intersect the antenna gain pattern envelope at 1.5° off-axis or less. However, AvL believes that it should not be necessary to require coordination with the target satellite operator or any adjacent satellite operators if the Ku-band antenna gain pattern intersection falls between 1.5° and 1.8° if it can be demonstrated that considering pointing accuracy there little possibility of causing harmful interference to adjacent satellites.

2. AvL recommends that the FCC include antenna pointing accuracy and wind loading performance for motorized antennas and allow small antennas with main lobes that exceed the recommended 1.5°

3. The FCC did not clarify its position on non-circular reflectors. AvL believes that for all non-circular reflectors the applicable antenna dimension and associated sidelobe pattern used to demonstrate compliance with 25.209 must be kept aligned with the GSO plane for all non-circular reflectors. This requirement should be added to the FCC rules.

4. AvL agrees with adopting an off-axis angle starting at 3° for conventional Ku-band gain envelope outside the GSO plane.

5. AvL Technologies endorses increasing the beginning of the 25.209 a) to 1.5° but allowing antennas to be routinely licensed if demonstration of pointing ability meets requirements of 25.209 f) in addition to routine licensing if power is reduced to meets FCC requirements. Requiring affidavits from adjacent satellite operators up to 6° away is far too cumbersome and will slow down and maybe stymie the use of the

smallest feasible aperture that meets 25.209 f). Pointing ability is clearly defined in Electronics Institute of America's RS-411 "Electrical and Mechanical Characteristics of Antennas for Satellite Communications "Chapter Three. This definition of rms pointing error could be applied to demonstrate compliance to 25.209 f).

6. Attempting to control adjacent satellite interference only by aperture size only is already not working. The FCC is licensing temporary-fixed 1.2 meter antennas using standard gear drives produced by novice satellite antenna manufacturers that have up to 1° of backlash. Therefore any wind disturbance can cause the antenna to easily be mispointed such that 25.209 f) is grossly violated. However this 1° of movement will not necessary cause a loss of sufficient signal to cause loss of modem lock or visible degradation of video signal to alert the user. The FCC would have to increase the aperture size at Ku band to a 1.5M to guarantee no accidental adjacent satellite interference without the user knowing the antenna has been miss-pointed. Backlash should be controlled to less than 0.1° in azimuth and less than 0.2° in elevation for all size antenna apertures.

7. AvL recommends that applications for temporary-fixed antennas should include pointing accuracy demonstration along with antenna patterns for all antennas now considered non-compliant because of antenna beamwidth.

8. The Satellite Industry Association in its recent Petition for Reconsideration dated July 8, 2005 noted that "Smaller earth stations are, in turn, typically prone to larger pointing errors than those of larger antennas. AvL completely agrees. This is due in large part to the manual pointing of fixed VSAT antennas. Most methods in use today only provide the installer with a receive signal level indicator. With the much broader main beam widths encountered with the smaller antennas it is probable that the antenna can be incorrectly manually aligned on the center of the main beam. The network operator is usually not aware of the mispointing because of perceived acceptable link performance. While not causing performance degradation to the return link, however, harmful interference from the main lobe is directed to an adjacent satellite. ViaSat and others have recognized this and have developed techniques and procedures that, although more costly, can accurately peak the antenna to the center of the main beam.

9. AvL agrees further with SIA's concerns stated in their Petition for Reconsideration dated July 8, 2005. Simply relaxing the start of the gain pattern envelope to 1.5° off-axis and address antenna pointing error issues by simply requiring "VSAT network operators to design their networks to stop transmissions when synchronization fails.", AvL believes will not have the desired affect of minimizing harmful interference. With the wider beamwidths the antenna mispointing can be well beyond the 0.5° (recommend in FCC 04-286 on ESVs) before the return side of the link degrades to a point where it looses synchronization. In a large network with various antenna sizes and vast coverage areas and associated footprint variations the link margins may be significant and degradation of greater than 10 dB may be required before synchronization is lost. Other methods must be used to sense movement of the antenna

instead of modem lock. Computer controlled positioning antennas inherently have methods of sensing antenna movement and ceasing transmission.

10. AvL asks the FCC to recognize that fixed temporary antennas with computer pointing pose less threat to adjacent satellite fixed manually pointed antennas. They eliminate human errors and usually transmit for finite periods of time.

11. AvL asks the FCC to consider that the original technical investigation and proposal for 2° satellite spacing in 1983 included sidelobe excursions of up to 3 dB above the 29-25 log Θ curve. This potential, occasional, random increase in energy directed at adjacent satellites was evaluated to be acceptable. This 3 dB excursion was deleted from the final Rule and Order without technical consideration. AvL proposes that an additional, occasional increase in energy directed at adjacent satellites and should be allowed by the FCC to maximize the use of the satellite communications frequency bands. Note is 25.133 (b) the FCC already allows 2 dB excursions over 25.209 after completion of construction of satellite earth station antennas.

AvL Technologies would like to have the opportunity to further demonstrate that computer pointing is a proven, reliable technology that should be considered by the FCC in routine licensing of temporary fixed earth station antennas.

Accordingly, AvL respectfully the Commission to take these Comments into consideration.

Respectfully submitted,

AvL Technologies, Inc.

By: William K. Coulter

William K. Coulter, Esq.
Its Attorneys
Coudert Brothers LLP
1627 I Street, N.W.
Suite 1200
Washington, DC 20006
Tel: (202) 775-5100

Attachment 2

AvL TECHNOLOGIES
130 Roberts St. Asheville, NC 28801 ph 828.250.9950 fx 828.250.9938

The SIA's proposal contained in their Comments submitted on September 6, 2005 is a method to allow smaller aperture antennas. While it is interesting, it may be more than the FCC would like to consider in changing the rules. AvL's understanding is that the real objective is to control energy transmitted to adjacent satellites so that it does not exceed what is currently allowed. The current rules and regulations of 25.209 allow approximately 7.5 dBw/4kHz at the adjacent satellite spaced at 2°. The assumption has been that the pointing error requirements of the user of the satellite antenna to maintain maximum gain will naturally keep the energy directed toward the adjacent satellite at 2° somewhere near the 7.5 dBw/4KHz. The unknown is how much greater than 7.5 dBw/4Khz is routinely directed at the adjacent satellites. This increase can occur from miss-pointing of the antenna during installation and operation, deflection due to wind, settling of a foundation after installation, incorrect forward power control, etc. It can also occur from side lobes of the actual antenna exceeding the 29-25 log T envelope due to general manufacturing and installation anomalies. None of these potential variations have ever been addressed in the rules and regulations except for potential construction errors which are addressed in 25.133 where the FCC requests that large antenna performance be confirmed to meet the 25.209 within 2 dB. Even with this test it is only confirming performance in two pattern cuts, which are rarely cuts parallel to the orbital arc. Therefore, even with our current rules and procedures there are numerous unknowns that determine how much energy is actually being transmitted to adjacent satellites. What we do know is that the current system seems to work fine.

AvL proposes that there is reasonable probability that occasionally, for any of the reasons above, the energy transmitted toward the adjacent satellite for totally compliant antennas exceeds the desired 7.5 dBw/4kHz by as much as 3 dB. The 0.5° pointing error the FCC accepts is equivalent to allowing an increase of the energy by 3 dB because of miss-pointing. The good news is that it is equally probable that the increase in potential energy to the adjacent satellite never occurs.

For antenna performance anomalies, the side lobes are peaks and valleys. There is a better chance the peak of the side lobe is not pointed at an adjacent satellite. An analysis of all the possible results from miss-pointing a satellite antenna shows that there is a higher probability that the miss-pointing will point away from an adjacent satellite, rather than pointing toward an adjacent satellite.

Therefore, AvL recommends that instead of more rules for smaller aperture antennas, that the FCC proposed revision of the rules and regulations be interpreted to mean that rules are the design and manufacturing goals and that there is a very high probability that the actual conditions will not increase the energy to the adjacent satellite under all operating conditions by no more than 3 dB than the rules and regulations intend. This will allow pointing accuracy, construction and manufacturing anomalies, actual antenna performance, reduction in power for forward power control for rain fade, etc. to be appropriately applied by qualified engineers in their system design and

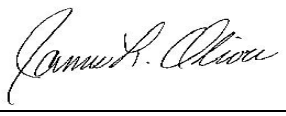
commissioning. Interestingly, this is identical to the original rules and regulation proposed by the FCC for 2° satellite spacing in the early 1980s where side lobes of the antenna could exceed the mask by up to 3 dB.

The FCC can be easily relieved of having to evaluate non-compliant license requests that use advances in technology with smaller aperture antennas by requiring that the analysis and system design be certified by a registered Professional Engineer. Registered Professional Engineers are bound by law of the state in which they are registered to submit only correct information of which they have expertise to evaluate and approve. Submission of incorrect or fraudulent information is punishable by law. This method has been successfully used for approving all designs and construction of projects which can affect the life and health of the public including buildings, bridges, aircraft, etc. Generally, it is impossible for the governing authority to have the expertise required for the type of judgment the Registered Professional Engineer is qualified to make. Why not use a proven system to assure proper application of rules and regulations?

In conclusion, AvL endorses the SIA and FCC proposal to move the mask to begin at 1.5° for routine licensing. However, this limits aperture size to 1M at Ku-band and 2.4M at C-band for routine licensing and only allows reduction of power or obtaining affidavits from adjacent satellite operators for smaller antennas. Adding the pointing accuracy formula proposed by the SIA is interesting but may be more than the FCC would like to consider at this time. In any event, the SIA proposal should be based on the major axis diameter aligned with the orbital arc instead of the equivalent diameter. AvL supports the SIA in looking for a method for improved technologies related to pointing for consideration with a license application. If the energy directed toward the adjacent satellite is controlled to meet the FCC intent, why must it be approved by adjacent satellite operators? AvL has experienced it taking months to get adjacent satellite operator affidavits. Adjacent satellite operators should only be involved if the proposed nominal design energy exceeds FCC intent. AvL believes with current regulations, energy to the adjacent satellite can be as high as 3 dB considering all operating conditions. Only if the design of the license application exceeds the intended energy directed at an adjacent satellite under normal conditions should affidavits be required.

Respectfully submitted,

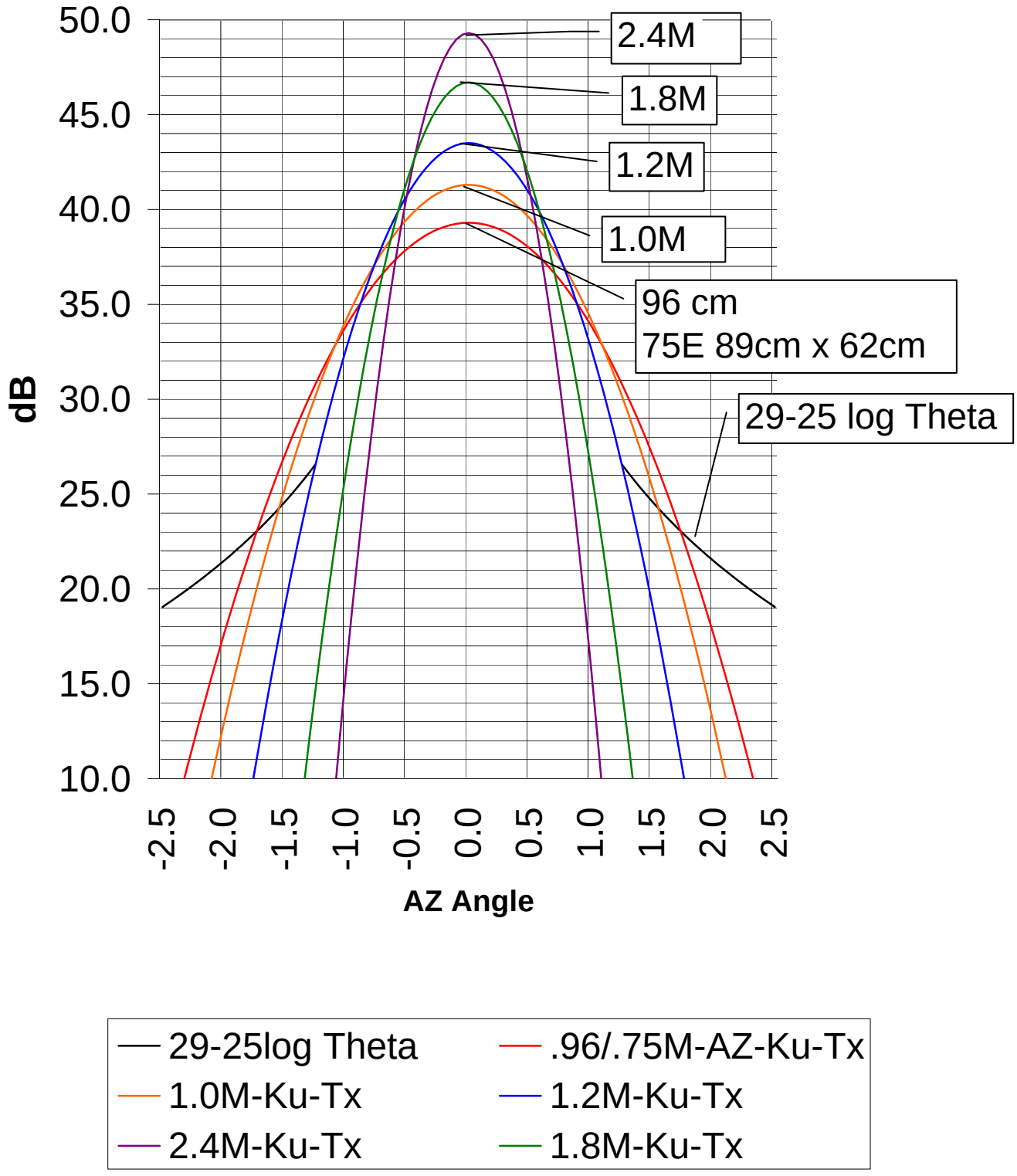
AvL Technologies

By 

James Oliver, President
130 Roberts Street
Asheville, NC 28801
Tel: (828) 250-9950

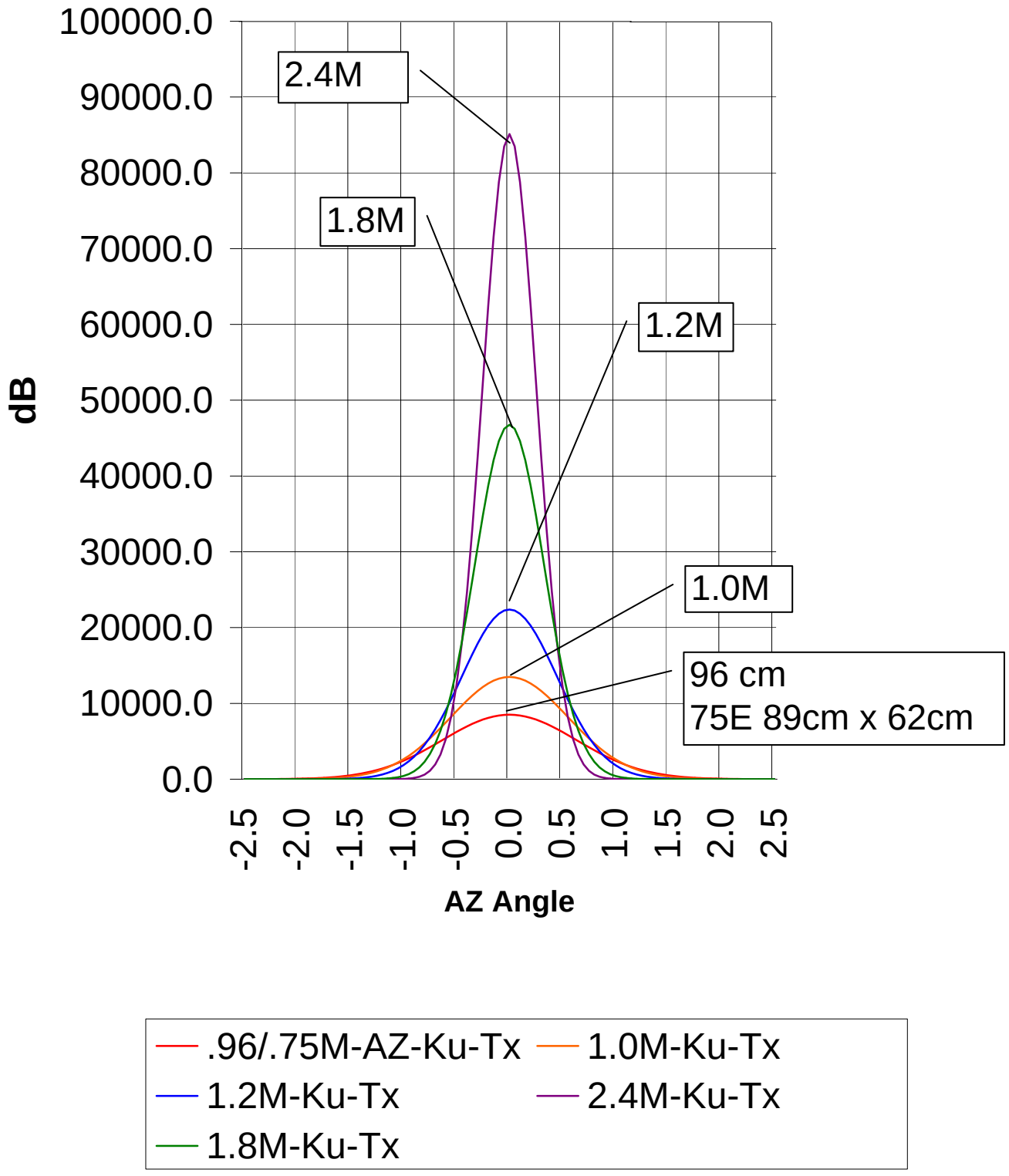
Attachment 3

PATTERN COMPARISON KU TX

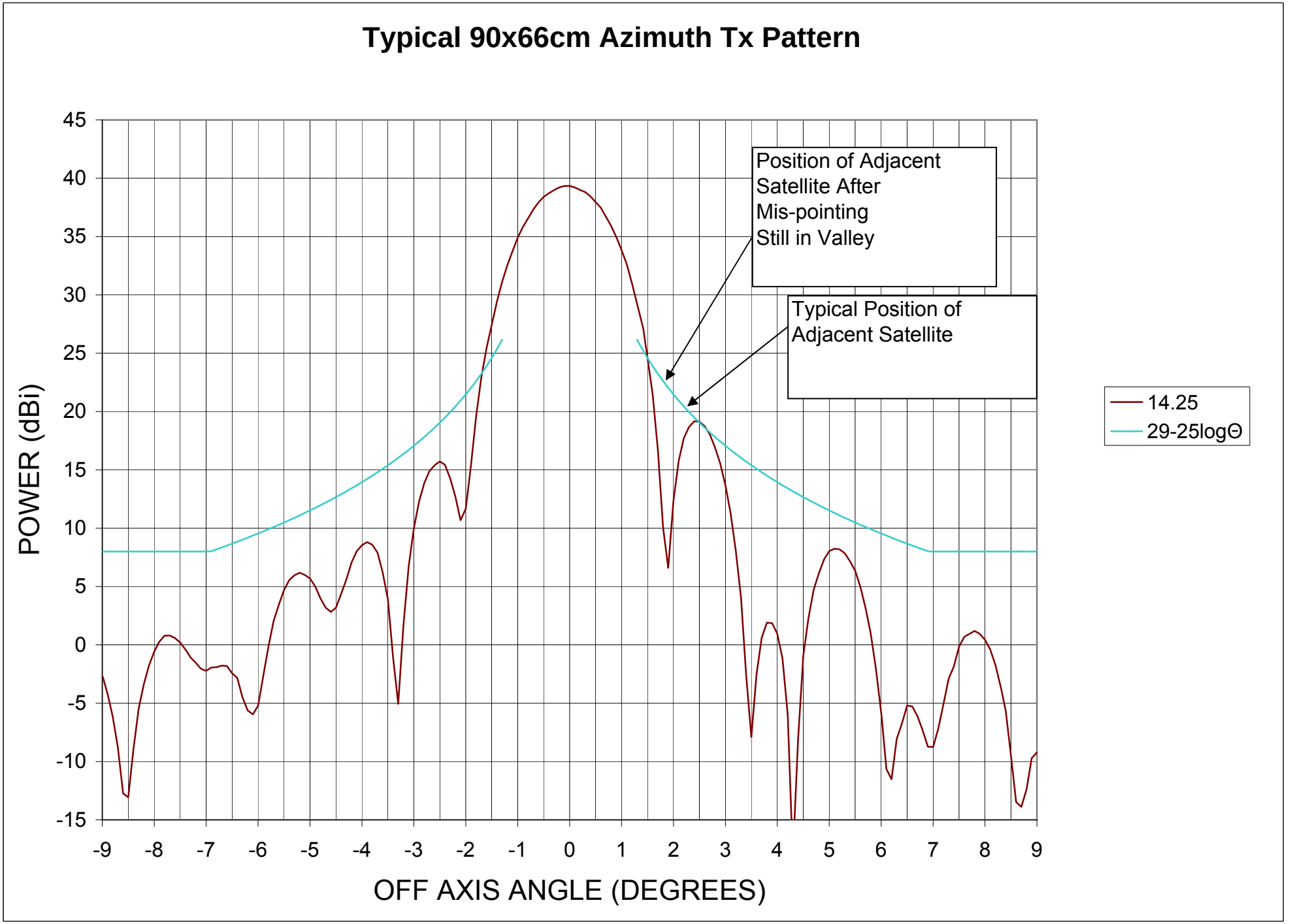


Attachment 4

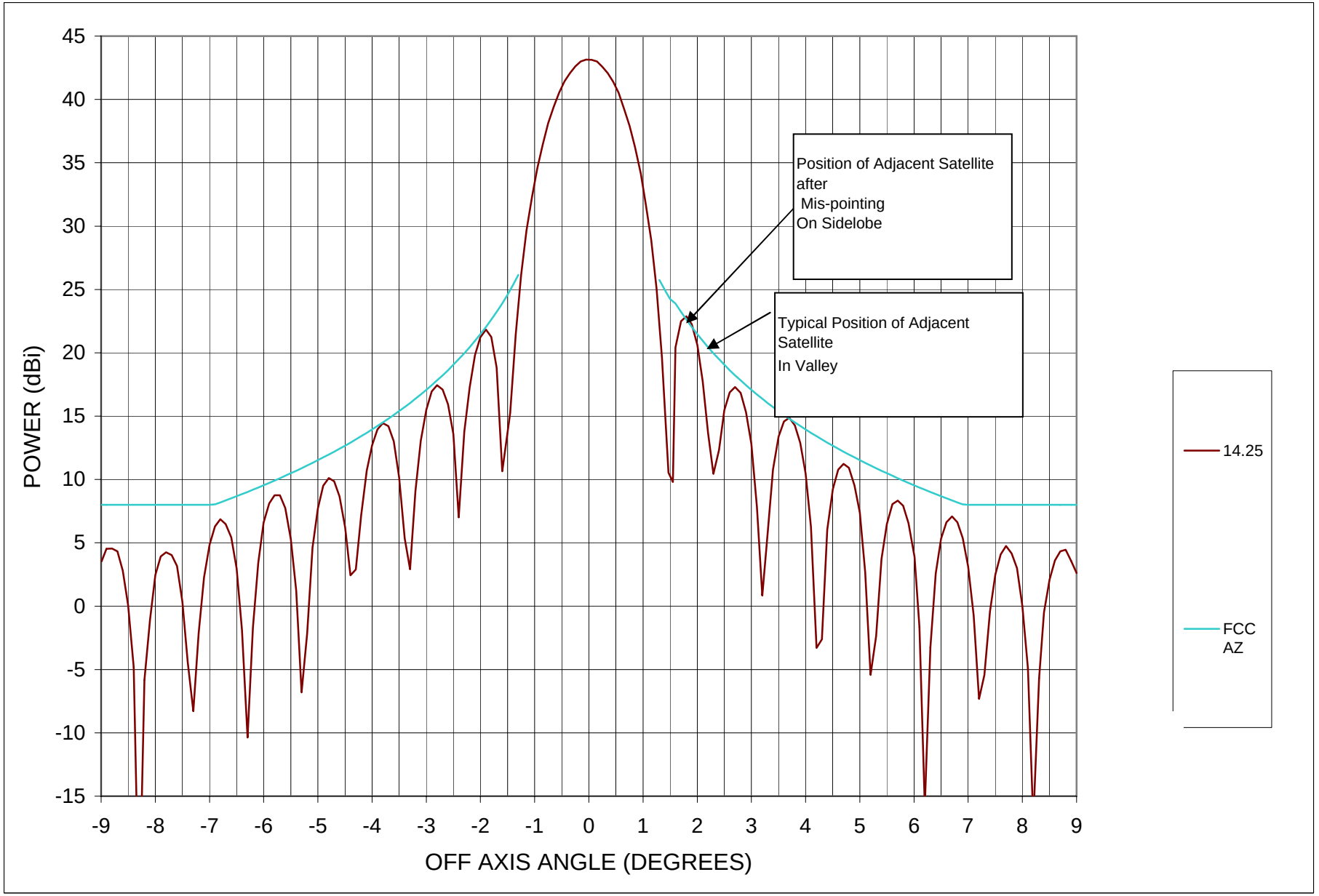
PATTERN COMPARISON KU TX



Attachment 5



Typical 1.2M Tx Pattern



AZIMUTH AXIS HORIZONTAL POLARIZATION

Attachment 7

Reason for Rotating Elliptical Antennas to Align with Orbital Arc